

REMARKS

In the Office Action dated September 14, 2010, claims 21-46 are pending and all claims are rejected. Reconsideration is requested at least for the reasons discussed hereinbelow.

Objections were made to claims 21 and 31-43. The above amendment is submitted to make the corrections kindly identified by the Examiner. No new matter is added.

Claims 39, 45 and 46 are rejected under 35 U.S.C. §112, second paragraph. Corrections kindly suggested by the Examiner are presented in the amendment above. No new matter is added.

Claims 21-25, 28, 32, 35-39 and 43-46 are rejected under 35 U.S.C. §103(a) over Goetsch et al. (US 2001/0028171; "Goetsch") in view of Pfister et al. (US 2001/0042378; "Pfister").

The Examiner admits that Goetsch fails to "teach that the ammonia storage device (i) comprises an ammonia absorbing and releasing salt of the general formula: $M_a(NH_3)_nX_z$, wherein: M is one or more cations selected from the group consisting of alkali metal, alkaline earth metal, and transition metal ions, or combinations thereof, X is one or more anions selected from the group consisting of fluoride, chloride, bromide, iodide, nitrate, thiocyanate, sulphate, molybdate, and phosphate ions, *a* is the number of cations per salt molecule, *z* is the number of anions per salt molecule, and *n* is the coordination number of 2 to 12.

The Examiner also admits that Goetsch fails to "teach (ii) means for heating said container and ammonia absorbing and releasing salt for releasing ammonia gas."

The Examiner cites Pfister for the generation and utilization of ammonia gas and a teaching that ammonia is stored in an ammoniated metal salt and for adsorbing and desorbing ammonia gas using heat.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art at

the time of the invention to have used the ammonia absorbing and releasing salt such as disclosed in Pfister in the electric power generation unit of Goetsch. The Examiner contends that the skilled artisan would have looked for sources of ammonia and ways to store it in an ammonia storage device of Goetsch and would have appreciated that the metal salts of Pfister provide a solid form of ammonia storage, which means that ammonia can be generated by heating based on demands of the ammonia dissociation reactor and hydrogen fuel cell.

Applicants strongly disagree. Metal ammine salts almost exclusively have been used in applications where the ammonia contained in them was not consumed, but continuously absorbed and desorbed without consuming the ammonia contained therein, such as in refrigerating systems where ammonia is the cooling agent, or in applications where ammonia pressure vessels would have been too heavy, such as in automotive applications.

Goetsch discloses a method for producing hydrogen. He mentions that one use of the hydrogen can be for generating electricity.

Pfister discloses improved methods for controlled generation of ammonia from an ammoniated metal salt. In the background [0002], Pfister states that the methods are useful for adsorption type refrigeration systems. Indeed, Pfister also only mentions refrigerating applications explicitly (see the description of the figures and the example).

It is not seen how one of ordinary skill in the art would have been motivated to combine these two references. Much less is it seen that one of ordinary skill in the art would have combined these references to make the presently claimed electric power generating **unit**.

The reason why metal ammine salts have not been used in other applications, where possible large amounts of ammonia have to be stored and released, is the costs of ammonia storage in and delivery from metal ammine salts. The ammonia which otherwise would be used directly, has first to be absorbed by metal salts, which by themselves add extra costs, besides the costs of the

process for saturating the salts. Furthermore, the release of ammonia from the metal ammine salts is endothermic and therefore requires considerable energy.

Therefore, the skilled artisan would not consider metal ammine salts as a source of ammonia in applications where ammonia in great amounts and, therefore, a high storage capacity has to be provided.

To the contrary, Goetsch discloses decomposing ammonia in a reactor requiring flow rates of $30,000 \text{ hr}^{-1}$ to $1,000,000 \text{ hr}^{-1}$ where flow rates are in terms of gas hourly space velocities (GHSV) which is typically a measurement of standard volumetric flow rate of feed gas divided by catalyst bed volume (page 4, paragraph [0037]). Thus, it is respectfully submitted that one of ordinary skill in the art would not have considered the metal salts of Pfister to be used for storage of ammonia to supply the reactor of Goetsch.

Further, there is no suggestion in Goetsch for a power generating unit comprising both (1) an ammonia storage device in the form of a container with ammonia containing metal salt and with means for heating to the metal salt to absorb and release the ammonia, and (2) and (a) an fuel ammonia cell or (b) a reactor for dissociating ammonia and a hydrogen fuel cell.

Such an electric power generating unit is not even suggested by Goetsch.

Claim 44 and the dependent claims are patentable for at least the same reasons as discussed above.

Thus, it is not seen how the presently claimed invention would have been obvious to one of ordinary skill in the art in view of any combination of Goetsch and Pfister.

Claim 26 is rejected under 35 U.S.C. §103(a) over Goetsch and Pfister in view of Smith et al. (US 2002/0166335; "Smith"). Goetsch and Pfister are discussed above. Smith disclose a

refrigeration cooling device. Smith also fails to teach or suggest an electric power generating **unit**, much less a power generating unit using an ammonia storage device comprising an ammonia absorbing and releasing metal salt, as claimed herein.

Thus, it is not seen how the presently claimed invention would have been obvious to one of ordinary skill in the art in view of any combination of Goetsch, Pfister and Smith.

Claim 27 is rejected under 35 U.S.C. §103(a) over Goetsch and Pfister in view of Tabor et al. (*sic*; Shomphe et al.) (US 3,423,574; “Tabor”). Goetsch and Pfister are discussed above. Tabor discloses an electrical resistance heating pad. Tabor also fails to teach or suggest an electric power generating **unit**, much less a power generating unit using an ammonia storage device comprising an ammonia absorbing and releasing metal salt, as claimed herein.

Thus, it is not seen how the presently claimed invention would have been obvious to one of ordinary skill in the art in view of any combination of Goetsch, Pfister and Tabor.

Claims 29, 30 and 40-42 are rejected under 35 U.S.C. §103(a) over Goetsch and Pfister in view of Holladay et al., “Microfuel processor for use in a miniture power supply,” Journal of Power Sources, 108 (2002) (“Holladay”). Goetsch and Pfister are discussed above. As aforesaid, neither of these, nor their combination disclose or suggest an electric power generating **unit**. Although Holladay discloses a microscale fuel reformer and a miniature fuel cell, it is not seen how one of ordinary skill in the art would have combined these references to have arrived at the present invention. There is no suggestion in the combination of references for a microscaled ammonia storage device comprising an ammonia absorbing and releasing metal salt.

Thus, it is not seen how the presently claimed invention would have been obvious to one of ordinary skill in the art in view of any combination of Goetsch, Pfister and Holladay.

Claims 33 and 34 are rejected under 35 U.S.C. §103(a) over Goetsch and Pfister in view of

Mao et al. (US 2003/0104936). Goetsch and Pfister are discussed above. Mao discloses an unsupported nanoparticle catalyst. Mao also fails to teach or suggest an electric power generating **unit**, much less a power generating unit using an ammonia storage device comprising an ammonia absorbing and releasing metal salt, as claimed herein.

Thus, it is not seen how the presently claimed invention would have been obvious to one of ordinary skill in the art in view of any combination of Goetsch, Pfister and Mao.

If for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. 04-1105.

In view of the discussion above, Applicant respectfully submits that the pending application is in condition for allowance. An early reconsideration and notice of allowance are earnestly solicited.

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Respectfully submitted,

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